

IT IS DESIRED TO SECURE AND CLAIM BY LETTERS PATENT:

1. A largely spray-formed, shock-protective, multilayer helmet shell comprising

a helmet-shaped structural central layer having inner and outer surfaces,

5 a helmet-shaped structural inner layer joined to the inner surface of said central layer, which inner layer has been formed to its final shape substantially entirely by a first vapor-suspension deposition material that has been sprayed onto the inner surface of said central layer, and

10 a helmet-shaped structural outer layer joined to the outer surface of said central layer, which outer layer has been formed to its final shape substantially entirely by a second vapor-suspension deposition material which has been sprayed onto the central layer's outer surface.

15 2. The helmet shell of claim 1, wherein said central layer is formed of a soft, pliable, microcellular, viscoelastic foam material, and said inner and outer layers, in their final conditions, take the forms of relatively rigid jackets substantially, and collectively cooperatively, encapsulating the central layer.

3. The helmet shell of claim 2, wherein the surface interfaces between the central layer, and the inner and outer layers are characterized by unitizing mechanical bonds between the layers.

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4. The helmet shell of claim 3, wherein said mechanical bonds result from the suffusing of inner and outer layer material onto the surface structure of said central layer.

10 5. The helmet shell of claim 1, wherein said central layer is formed of an acceleration-rate-sensitive material.

6. A method of making a multilayer helmet shell comprising utilizing an appropriate, generally sheet-like body of a first selected material, shaping and configurationally supporting a generally helmet-shaped central structural core layer having inner and outer surfaces, and forming a first precursor helmet shell,

5 while so supporting that core layer, assuring the substantially full-access exposure of at least one of such surfaces,

directing toward such at least one surface a spray of a first, selected, vapor-suspension deposition material to form on, and joined to, that surface another structural layer, which other layer, along with the core layer, form a second precursor helmet shell,

10 thereafter, assuring the substantially full-access exposure of the other one of such surfaces, and

then directing toward such other surface a spray of a second, selected, vapor-suspension deposition material to form on, and suitably joined to, that other surface a third structural layer, thus completing the fabrication of the intended, finished helmet

15 shell.

7. The method of claim 6, wherein said shaping and configurationally supporting steps are performed in relation to a generally helmet-shaped external structure.

8. The method of claim 6, wherein each of said two directing steps is performed in relation to a different generally helmet-shaped external structure which furnishes support for the particular precursor helmet shell then being sprayed.

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9. The method of claim 8, wherein one of such external structures is generally female in nature, and the other such structure is generally male in nature.

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10. A method of making a multilayer helmet shell comprising  
in a generally helmet-shaped female cavity, placing a generally form-fitting,  
structural, pliable layer of a selected central core material so that the same generally takes  
the form of a helmet shape having an exposed inner surface,

5           directing a spray of a first, selected, vapor-suspension deposition material onto the  
exposed inner surface of the core material in the cavity to form a structural inner layer  
which bonds to that inner surface, and which generally stabilizes, into a helmet shape, the  
three-dimensional configuration of the combined core material and inner layer,

10           removing the joined central core material and inner layer from the cavity, and  
placing this assembly onto a generally helmet-shaped male mandrel, with the core  
material having an exposed outer surface,

          directing a spray of a second, selected, vapor-suspension deposition material onto  
the exposed outer surface of the core material to form a structural outer layer which  
bonds to that outer surface, and which collectively, with the inner layer, forms a  
15        substantially fully encapsulating jacket around the core material, and

          removing from the mandrel, as a finished helmet shell, the assembly of the inner  
layer, the core material, and the outer layer.

11. A method of making a multilayer helmet shell comprising shaping and configurationally stabilizing a sheet-like blank of a selected core material into the general form of a desired helmet shell, with that form having exposed surface regions,

5 employing a curable-to-semi-rigidity, vapor-suspension deposition material, directing one or more spray(s) of such material onto exposed surface regions of that blank, and

appropriately curing to semi-rigidity such sprayed material.

10 12. A method of making a multilayer helmet shell comprising shaping and configurationally stabilizing a sheet-like blank of a selected core material into the general form of a desired helmet shell, with that form having exposed surface regions,

15 employing a curable-to-semi-rigidity, vapor-suspension deposition material, directing one or more spray(s) of such material onto exposed surface regions of that blank,

appropriately curing to semi-rigidity such sprayed material, and

by said spraying and curing, and essentially solely by said spraying and curing,

20 creating a final exposed surface topography for the desired final helmet shell.

13. A method of making a multilayer helmet shell comprising  
preparing an environment for shaping a received spray of structural vapor-  
suspension deposition material into a structural component in a helmet shell,  
directing a spray of such material into that environment, and  
thereby producing the desired helmet-shell structural component.

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14. A method of making a multilayer helmet shell comprising  
shaping and configurationally stabilizing a sheet-like blank of a selected core  
material into the general form of a desired helmet shell, with that form having exposed  
surface regions,  
employing a curable-to-semi-rigidity, vapor-suspension deposition material,  
directing one or more spray(s) of such material onto exposed surface regions in that  
blank, and  
15 appropriately curing to semi-rigidity such sprayed material.

15. A method of making a multilayer helmet shell comprising shaping and configurationally stabilizing a sheet-like blank of a selected core material into the general form of a desired helmet shell, with that form having exposed surface regions,

5 employing a curable-to-semi-rigidity, vapor-suspension deposition material, directing one or more spray(s) of such material onto exposed surface regions in that blank,

appropriately curing to semi-rigidity such sprayed material, and

10 by said directing and curing, and essentially by said directing and curing alone, creating a final exposed surface topography for the desired final helmet shell.

16. A method of making a multilayer helmet shell comprising

15 preparing an environment for shaping a received spray of structural vapor-suspension deposition material into a structural component in such a shell, directing a spray of such material into that environment, and thereby effecting the production of the desired structural component.